8. LOW-LEVEL RADIONUCLIDE-CONTAMINATED SOIL/SEDIMENT RELEASE SITES

Remedial action is required for two low-level radionuclide-contaminated soil/sediment release sites: (1) the Soil Contamination Area South of the Turntable (TSF-06, Area B) and (2) the Disposal Pond (TSF-07). Releases at these sites may pose an imminent and substantial endangerment to human health and the environment. The site characteristics, including the nature and extent of contamination, the summary of site risks, remedial action alternatives, and the selected remedy are presented for these sites. More detailed information about the low-level radionuclide-contaminated soil/sediment release sites can be found in the OU 1-10 RI/FS Report (DOE-ID 1997b).

8.1 Soil Contamination Area South of the Turntable

The Soil Contamination Area South of the Turntable (TSF-06, Area B) is an open area bounded by the TSF fence on the west, and facility roads and several adjacent structures on the east and south (Figure 8-1). The site is approximately 205.8-m (675-ft) wide on the southern boundary and 129.6-m (425-ft) wide on the western boundary.

Surface soil at the site was contaminated by windblown radioactive particles from the contaminated soil at the PM-2A Tanks site (TSF-26). Contamination is suspected of extending beneath the adjacent road (Snake Avenue). Three patches of contamination remain in an approximate 152- by 30-m (500- by 100-ft) area after previous removal actions.

Currently, the site is administratively controlled. The site is within TSF-06, which is fenced and posted with signs that identify it as a CERCLA site. No activities can be performed within the site without contacting the INEEL Environmental Restoration Program. The purpose of these controls is to keep worker exposures ALARA and to prevent the spread of contaminated soil. The controls reduce current and future occupational exposure at the site to acceptable levels.

8.1.1 Summary of Site Risks

A HHRA and an ERA were conducted for the Soil Contamination Area South of the Turntable site. The results of the assessments indicate that this site may present an imminent and substantial endangerment to human health and the environment, and are summarized in Table 8-1. A more detailed discussion of the methods used in the risk assessment process is presented in Section 6 of this ROD. Detailed information about the results of the HHRA and ERA is presented in Sections 6 and 7 of the OU 1-10 RI/FS Report.

8.1.1.2 Human Health Risks. The exposure route and the associated COCs that produce calculated risks greater than or equal to 1 in 10,000 at the site are external radiation exposure of current and future workers by Cs-137 and external radiation exposure of future residents by Cs-137. The results of the assessments are summarized in Table 8-1.

8.1.1.3 Ecological Risk Assessment. The Soil Contamination Area South of the Turntable was identified in the ERA as having an ecological risk (i.e., the HI) less than the threshold level of 1 and is considered not to pose an unacceptable threat to ecological receptors. No further ERAs will be performed at this site.

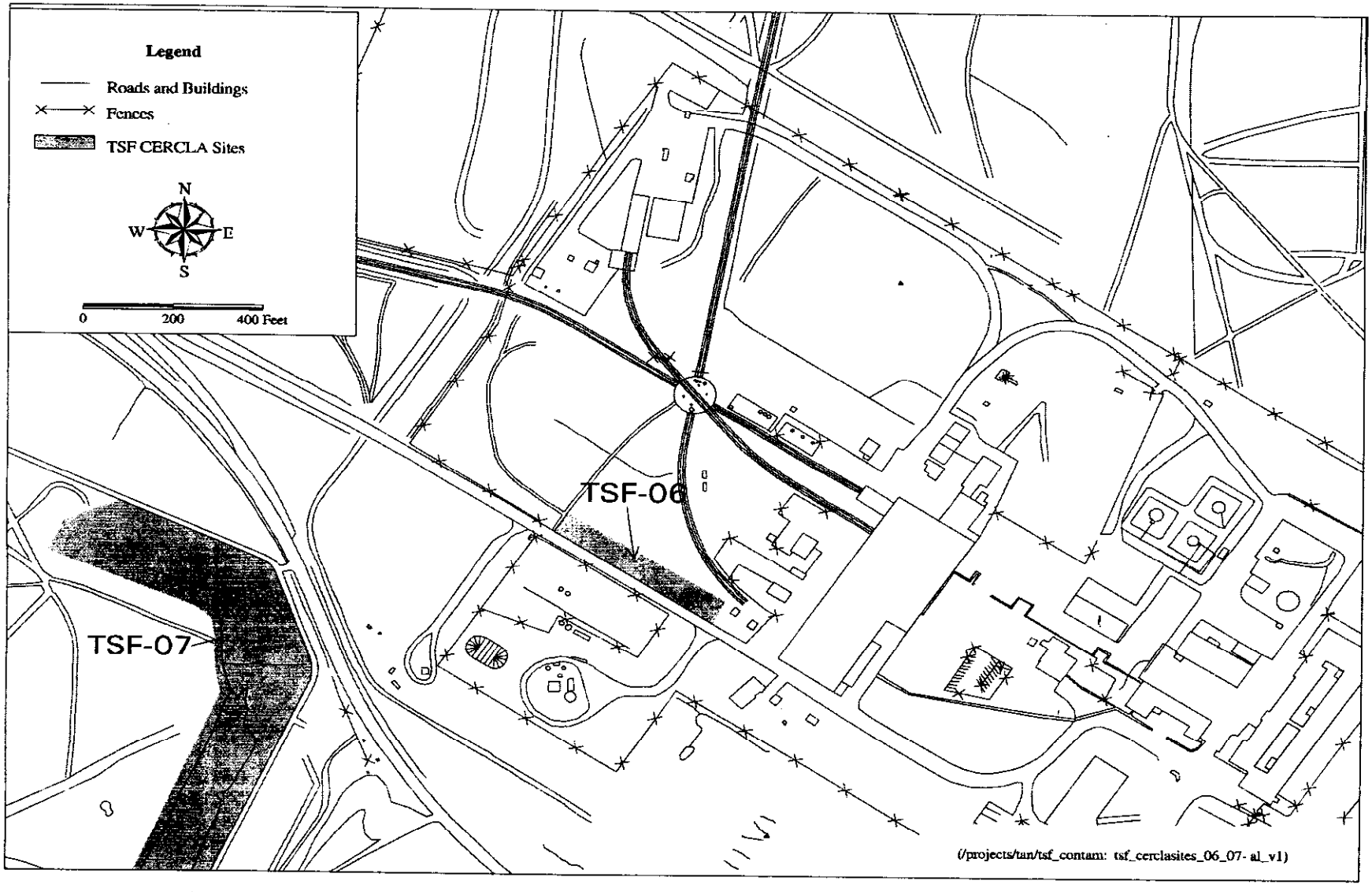

Figure 8-1. Radionuclide-contaminated soil/sediment release sites.

Table 8-1. Summary of risk estimates for the Soil Contamination Area South of the Turntable, Area B.

Scenario	Total Cancer Risk	Total Hazard Index
Occupational	1 in 10,000	0.00001
Residential	3 in 10,000	1

8.1.2 Summary of Alternatives

In accordance with CERCLA Section 121, the OU 1-10 FS identified and evaluated remediation alternatives. Any selected alternative had to achieve the remediation goal of 23.3 pCi/g for Cs-137. The Cs-137 FRG of 23.3 pCi/g is a risk based remediation goal that ensures protectiveness of human health and the environment. This FRG will provide unrestricted land use in 100 years. The principal ARAR evaluated for the Soil Contamination Area South of the Turntable was the Idaho Fugitive Dust Emissions requirements. In addition to the "No Action" alternative, two alternatives were evaluated to remediate the Soil Contamination Area South of the Turntable:

- Alternative 2: Containment
- Alternative 3: Excavation and Disposal.

Details of the alternatives considered and the evaluation process are included in Sections 10 and 11 of the OU 1-10 RI/FS Report.

8.1.2.1 Alternative 2: Containment. Under Alternative 2, the contaminated site would be covered with either a native soil cover (Alternative 2a) or an engineered barrier (Alternative 2b). The native soil cover would be a layer of INEEL soil covered by surface vegetation or a layer of rock to control surface exposures to subsurface radionuclides. The engineered barrier would be a cap of multiple layers of native geologic materials. The cap would control surface exposures to subsurface radionuclides and inhibit plants from growing and animals from burrowing at the site. In addition, institutional controls would be required to maintain the cover until the cesium decayed to acceptable levels. The costs for these alternatives are $2.8 and $2.6 million, respectively.

Both variations of Alternative 2 would accomplish the site RAOs in a long timeframe because contamination would be left in place. To accomplish the RAOs, long-term institutional controls must be implemented to protect future occupational and residential land use.

Alternative 2 would protect human health and the environment and comply with the regulations. Contamination would be left in place; however, it would be contained, resulting in moderate long-term effectiveness. This alternative would not reduce toxicity, mobility, or volume through treatment; however, it would prevent the spread of contamination from the site. There would be a possibility for worker exposure during construction of the cover, reducing the short-term effectiveness. Implementability of this alternative would be low because the alternative could not be implemented until some time in the future when Snake Avenue was not longer needed. The road would be difficult to relocate because of limited space.

8.1.2.2 Alternative 3: Excavation and Disposal. Under Alternative 3, the contaminated soil would be excavated and disposed of either on the INEEL (Alternative 3a) or off the INEEL (Alternative 3b) at an approved soil repository. The excavation would then be backfilled with clean soil. The costs for these alternatives are $2.2 and $5.1 million, respectively.

Both variations of Alternative 3 would accomplish the site RAOs in a short timeframe because contamination would be permanently removed. It is expected that no institutional controls would be required after the remedial action, and this will be verified by confirmational sampling.

Alternative 3 would protect human health and the environment and would comply with the regulations. This alternative would provide a high degree of long-term effectiveness because the contaminants would be removed. While this alternative would not reduce the volume or toxicity of the contaminants, it would reduce mobility (though not through treatment) because the contaminants would be moved to a managed area. The possibility of worker exposure to contaminants during excavation causes the short-term effectiveness of Alternative 3 to be moderate. Implementability would be high.

8.1.3 Summary of Comparative Analysis of Alternatives

The following sections summarize the evaluation of the candidate remedial alternatives according to the criteria identified in Section 7.1.3 of this ROD. Detailed comparative analyses can be found in Section 12 of the RI/FS Report.

8.1.3.1 Threshold Criteria. The two threshold criteria, which must be satisfied by the selected remedy, are overall protection of human health and the environment, and compliance with ARARs. Both alternatives and their variations (Alternatives 2a, 2b, 3a, and 3b) meet the threshold criteria.

8.1.3.2 Balancing Criteria. The five balancing criteria are: (1) long-term effectiveness and permanence, (2) reduction of toxicity, mobility, or volume through treatment, (3) short-term effectiveness, (4) implementability; and (5) cost.

Alternatives 3a and 3b best satisfy the criterion of long-term effectiveness because all contamination would be removed. Alternatives 2a and 2b only partially satisfy long-term effectiveness because contamination would be left in place, yet still contained. Reduction of toxicity, mobility, or volume through treatment is partially satisfied by Alternatives 3a and 3b; these alternatives would reduce mobility by moving the contamination to a managed facility. Alternatives 2a and 2b least satisfy the reduction criteria because they do not reduce toxicity, mobility, or volume; however, they do prevent the spread of contamination from the site. All of the alternatives partially satisfy short-term effectiveness because of the possibility of worker exposure. Alternatives 3a and 3b best satisfy implementability, while 2a and 2b least satisfy the criteria because the alternatives could not be implemented until some time in the future when Snake Avenue is no longer needed. Alternative 3a has the lowest estimated cost and Alternative 3b has the highest estimated cost.

8.1.3.3 Modifying Criteria. The modifying criteria, used in the final evaluation of remedial alternatives, are state and community acceptance. State acceptance is demonstrated by IDHW concurrence with the selected remedial alternative and signature of this ROD. The IDHW was involved in the development and review of the RI/FS Report (DOE-ID 1997b), the Proposed Plans (DOE-ID 1998a and DOE-ID 1998b), the FS Supplement (DOE-ID 1998c), this ROD, and other project activities such as public meetings.

For community acceptance, the factors that are considered include which elements of the alternatives interested persons in the community support, have reservations about, or oppose. The comments received on the Proposed Plan form the record of these opinions and concerns.

Generally, the selected remedy is supported. The Responsiveness Summary (Part III) portion of this ROD documents the full range and content of the public comments received regarding the recommended action at this site.

8.1.4 Selected Remedy: Alternative 3a, Excavation and On-Site Disposal

Based on consideration of the requirements of CERCLA, detailed analysis of alternatives, and public comments, the Agencies selected Alternative 3a, Excavation and On-Site Disposal. The selected remedy will satisfy the NCP requirements for the low-level threat posed by the Soil Contamination Area South of the Turntable. The major components of the selected remedy include:

- Sampling to identify the extent of soil exceeding the FRG and sample for contaminants that were identified in the PM-2A Tanks to support a no-longer-contained-in determination and HWD preparation for this site
- Removal of the adjacent road (Snake Avenue) and perform radiological surveys and sampling on the road base to determine areas exceeding the FRG
- Excavating contaminated soil to a maximum of 3 m (10 ft) or the maximum depth at which contaminant concentrations are above FRGs, whichever is less
- Sampling to verify the FRG was met
- Disposing of the contaminated soil at an acceptable soil repository
- Backfilling the excavated area with clean soil, then contouring and grading to surrounding soil.

The selected remedy addresses the risks posed by the Soil Contamination Area South of the Turntable, by effectively removing the source of contamination and thus breaking the pathway by which a future receptor may be exposed.

Implementation of this alternative would involve pre-excavation sampling to identify areas above the FRG. Additional samples would be collected to support a no-longer-contained-in determination and HWD due to windblown contamination from the PM-2A Tanks site.

After the no-longer-contained-in determination and HWD have been approved approximately 152 m (500 ft) of the adjacent road (Snake Avenue) will be removed. The asphalt before disposal will be surveyed by a radiological control technician and, if identified as clean, will be disposed at Central Facilities Area (CFA). If the radiological control technician is not able to release the asphalt, it will be sent to RWMC for disposal. Radiological survey and sampling would be conducted on the road base to determine areas exceeding the FRG.

Soil from the TSF-06 site and road base exceeding the FRG of 23.3 pCi/g Cs-137 will be excavated and transported to an approved soil repository. The actual disposal location, which could be the RWMC, the proposed ICDF, or another facility on or off the INEEL, will be determined during remedial design following implementation of the ROD. Selection of the ICDF for disposal of TAN materials depends at least in part on the timeframe associated with operation of the facility (scheduled for receiving waste in the Year 2005) and its waste acceptance criteria. Verification sampling will be used to ensure that all contamination is removed to a maximum of 3 m (10 ft) or maximum depths exceeding FRGs, whichever is less. The excavated areas will be backfilled with clean soil and seeded after excavation.

Based on the results of post remedial action sampling, institutional controls may be required. The controls, if necessary, will provide unrestricted land use in 100 years and will undergo 5-year reviews, as discussed in Section 10. Additional institutional control information is in Section 12.

This alternative represents the most permanent solution to the contamination problem and is the most cost-effective. The selected remedy is consistent with previous removal actions at TAN and would promote consolidation of the low-level radionuclide-contaminated soil/sediments in a centralized repository. Long-term monitoring and institutional controls are not expected to be required at the Soil Contamination Area South of the Turntable because the contamination will be removed. Some changes may be made to the remedy as a result of the remedial design and construction process that result from the engineering design process.

8.1.4.2 Estimated Costs for the Selected Remedy. The estimated capital and maintenance costs for implementing the selected remedy at the Soil Contamination Area South of the Turntable is $2,159,217. The costs are presented in net present value, which allows for equal comparison of long-term and short-term alternatives, while factoring in inflation. Details of these costs are presented in Appendix J of the RI/FS Report and summarized in Table 8-2.

8.1.4.3 Protection of Human Health and the Environment. The primary measure of the criterion of providing overall protection of human health and the environment is the ability of an alternative to achieve RAOs. Preventing contamination exposure to COCs in excess of 1 in 10,000 or HIs greater than or equal to 1 is key to meeting the RAOs and maintaining risk below acceptable levels.

Alternative 3a, Excavation and On-Site Disposal, would be effective for the long-term protection of human health through the removal of contaminants from the soil pathway. Performance standards will be implemented to ensure that the remediation activities will result in protection against direct exposure to the contaminants. The performance standard identified for this alternative includes removing the source of contamination so that the pathway by which a future receptor may be exposed is broken. This will be determined by confirmation sampling to ensure that the cleanup meets or exceeds remediation goals.

8.1.4.4 Compliance with ARARs. The Soil Contamination Area South of the Turntable is contaminated by windblown radiological contamination from the PM-2A Tanks (TSF-26) and a no-longer-contained-in determination will be prepared to support the HWD preparation. The selected remedy meets the identified ARARs as shown in Table 8-3.

8.1.4.5 Cost Effectiveness. The remedial action selected is cost-effective because it provides overall effectiveness in meeting the RAOs proportionate to its costs. When compared to other potential remedial actions, the selected remedy provides the best balance between cost and effectiveness in protecting human health and the environment.

Table 8-2. Cost estimate summary for the Soil Contamination Area South of the Turntable (TSF-06, Area B) selected remedy.

		$ Fiscal Year (FY)-97
FFA/CO Management and Oversight		
	WAG 1 – Management	212,778
Remediation Oversight		
	Construction Oversight	92,149
	Construction Project Management	153,582
	Remedial Action Document Preparation	24,233
	Remedial Action Report	10,880
	Packaging, Shipping, Transportation Documentation	19,512
	WAG-Wide Remedial Action 5-Year Review	N/A
Remedial Design		
	Title Design Construction Document Package	72,880
	Remedial Design Documentation per WAG 1 Baseline	31,928
	Prefinal Inspection Report	8,000
Remedial Action		
	Mobilization and Demobilization	10,000
	Excavate and Transport Contaminated Soil	250,000
	Replace Roadway	100,000
	Existing Power Poles Allowance	10,000
	Surveying, Grades, Lines, and Leveling	4,800
	Clean Fill and Reseeding	19,000
	Disposal Cost	520,000
	Subcontractor Indirect Costs	302,438
CAPITAL COST SUBTOTAL		1,842,180
	Contingency @ 30%	552,654
TOTAL CAPITAL COST IN FY-97 DOLLARS		2,394,834
TOTAL CAPITAL COST IN NET PRESENT VALUE		2,159,217
Operations		

Table 8-2. (continued).

		$ Fiscal Year (FY)-97
	WAG 1 – Management	N/A
	Annual Operations and Maintenance Reports	N/A
Decontamination and Dismantlement		N/A
Surveillance and Monitoring		N/A
OPERATION AND MAINTENANCE (O&M) COST SUBTOTAL		N/A
TOTAL O&M COST IN FY-97 DOLLARS		N/A
TOTAL O&M COST IN NET PRESENT VALUE		N/A
TOTAL PROJECT COST IN NET PRESENT VALUE		2,159,217

Table 8-3. ARARs for the Soil Contamination Area South of the Turntable (TSF-06, Area B) selected remedy.

Category	Citation	Reason	Relevancy[a]
Action Specific ARARs			
Rules for the Control of Air Pollution in Idaho	"Toxic Substances" IDAPA 16.01.01.161 "Toxic Air Emissions" IDAPA 16.01.01.585 and .586	The release of carcinogenic and noncarcinogenic contaminants into the air must be estimated before start of construction, controlled, if necessary, and monitored during excavation and sorting of soil.	A
	"Fugitive Dust" IDAPA 16.01.01.650 and .651	Requires control of dust during excavation, sorting, and removal of the soils.	
	"Requirements for Portable Equipment" IDAPA 16.01.01.500.02	Portable equipment for sorting and removal of the soils, and any portable support equipment must be operated to meet state and federal air emissions rules.	A
NESHAPs	"Radionuclide Emissions from DOE Facilities" 40 CFR 61.92 "Emission Monitoring" 40 CFR 61.93 "Emission Compliance" 40 CFR 61.94(a)	Limits exposure of radioactive contamination release to 10 mrem/yr for the off-Site receptor, and establishes monitoring and compliance requirements.	A
Resource Conservation and Recovery Act (RCRA) – Standards Applicable to Generators of Hazardous Waste	"Hazardous Waste Determination" IDAPA 16.01.05.006 (40 CFR 262.11)	A HWD is required for the soils and any secondary waste generated during remediation.	A
	"Manifest" IDAPA 16.01.05.006 (40 CFR 262 Subpart B) "Pre-Transportation Requirements" IDAPA 16.01.05.006 (40 CFR 262.30 – 262.33)	Establishes requirements for transporting hazardous waste to treatment and/or disposal site. Applies to any soils and secondary waste considered RCRA hazardous.	A

Table 8-3. (continued).

Category	Citation	Reason	Relevancy[a]
RCRA – Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Units	"General Waste Analysis" IDAPA 16.01.05.008 (40 CFR 264.13 (a)(1-3))	Analysis requirements only apply to RCRA hazardous soils and secondary waste generated during remediation.	A
	"Security of Site" IDAPA 16.01.05.008 (40 CFR 264.14)	If the soil site is determined to RCRA hazardous, measures must be taken to restrict access to the site during removal of soils and decontamination of equipment.	A
	"General Inspections" IDAPA 16.01.05.008 (40 CFR 264.15)	If the soil site is determined to be RCRA hazardous, regular inspections must be performed during remediation.	A
	"Personnel Training" IDAPA 16.01.05.008 (40 CFR 264.16)	If the soil site is determined to be RCRA hazardous, all personnel involved in soil excavation and sorting must be trained.	A
	"Preparedness and Prevention" IDAPA 16.01.05.008 (40 CFR 264 Subpart C)	Applies to soil excavation and decontamination activities if the soil site is determined to be RCRA hazardous.	A
	"Contingency Plan and Emergency Procedures" IDAPA 16.01.05.008 (40 CFR 264 Subpart D)	Applies to soil excavation and decontamination activities if the soil site is determined to be RCRA hazardous.	A
	"Equipment Decontamination" IDAPA 16.01.05.008 (40 CFR 264.114)	All equipment used during remediation must be decontaminated if RCRA hazardous waste is contacted.	A
	"Use and Management of Containers" IDAPA 16.01.05.008 (40 CFR 264.171 – 177)	Applicable to RCRA hazardous soils and associated hazardous secondary waste generated remediation that is managed in containers.	A
RCRA – Land Disposal Restrictions	"LDR Treatment Standards" IDAPA 16.01.05.011 (40 CFR 268.40(a)(b)(e))	Any secondary waste generated that is considered RCRA hazardous must be treated if necessary to meet LDR criteria before disposal.	A

Table 8-3. (continued).

Category	Citation	Reason	Relevancy[a]
	"Treatment Standards for Hazardous Debris" IDAPA 16.01.05.011 (40 CFR 268.45(a)(b)(c)(d))		A
	"Universal Treatment Standards" IDAPA 16.01.05.011 (40 CFR 268.48(a))		A
	"Alternative Treatment Standards for Contaminated Soils" IDAPA 16.01.05.011 (40 CFR 268.49)	Any excavated soils considered RCRA hazardous must meet the LDR standards for contaminated soil before disposal in an approved facility on the INEEL or off the INEEL.	A
	"CERLCA Off-Site Policy" 40 CFR 300.440		A
To-Be-Considered			
Radiation Protection of the Public and the Environment	DOE Order 5400.5, Chapter II (1)(a,b)	Order that limits the effective dose to the public from exposure to radiation sources and airborne releases.	
Institutional Controls	Region 10 Final Policy on the Use of Institutional Controls at Federal Facilities	Applies to contamination left in place or remaining above 1E-04 risk.	

a. A = applicable; RA = relevant and appropriate

NESHAPs = National Emission Standards for Hazardous Air Pollutants

IDAPA = Idaho Administrative Procedures Act

8.2 Disposal Pond (TSF-07)

The TAN Disposal Pond is a 14-ha (35-acre), unlined disposal pond in the southwest portion of TSF (see Figure 8-1). A 1-ha (2.5-acre) portion of the pond is still in use and will undergo assessment when operations cease. Only 2 ha (5 acre) in the northeast corner and on the eastern edge of the pond have been contaminated. Historically, the pond received sanitary waste discharges, low-level radioactive waste, industrial wastewater, and treated sewage effluent. The active portion of the pond is permitted by the State of Idaho to receive only sanitary and industrial waste. Sampling indicates that the cesium has migrated to approximately 3 m (11 ft) below the bottom of the pond.

Currently, the Disposal Pond is administratively controlled. The site is fenced and posted with signs that identify it as a CERCLA site. No activities can be performed within the site without contacting the INEEL Environmental Restoration Program and entry into the site requires radiological control precautions. The purpose of these controls is to keep worker exposures ALARA, and to prevent the spread of contaminated soil. The controls reduce current and future occupational exposure at the site to acceptable levels.

8.2.1 Summary of Site Risks

A HHRA and an ERA were conducted for the Disposal Pond site. The results of the assessments indicate that this site may pose an imminent and substantial endangerment to human health and the environment, and are summarized in Table 8-4. A more detailed discussion of the methods used in the risk assessment process is presented in Section 6 of this ROD. Detailed information about the results of the Disposal Pond HHRA and ERA is presented in Sections 6 and 7 of the OU 1-10 RI/FS Report.

8.2.1.2 Human Health Risks. The exposure route and the associated COCs that produce calculated risks greater than 1 in 10,000 at the site are external radiation exposure of current workers by Cs-137 and external radiation exposure of future residents by Cs-137.

A cumulative human health HI of 3 was calculated. However, no single contaminant had a HQ greater than 1. Specifically, the highest calculated HQ for an individual contaminant is mercury with a HQ of 0.9. All other individual contaminants have a HQ significantly less than mercury. This HI does not pose an unacceptable risk to human health or the environment because no one contaminant exceeds the threshold of 1.

8.2.1.3 Ecological Risk Assessment. The Disposal Pond was identified in the ERA as having an ecological risk (i.e., the HI) greater than the threshold level of 1 from arsenic, mercury, tetrahydrofuran, and thallium. The site will be considered under an INEEL-wide program to ensure it is not posing an unacceptable threat to ecocogical receptors at a population level. The WAG 10 Site-wide ERA will incorporate the results of the WAG 1 assessment to evaluate the potential effect of the sites at the population level. If remedial action is necessary, this action will be implemented by WAG 1 under a separate decision document.

Table 8-4. Summary of risk estimates for Disposal Pond.

Area	Scenario	Total Cancer Risk	Total Hazard Index
Test Area North Disposal Pond (Disposal Pond)	Occupational	1 in 10,000	0.00001
	Residential	8 in 10,000	3[a]

a. The residential scenario HI is principally a result of mercury (which has an HQ of 0.9). The rest of the value is produced by contaminants with individual HQ less than 1.

8.2.2 Summary of Alternatives

In accordance with CERCLA Section 121, the OU 1-10 FS identified and evaluated remediation alternatives. Any selected alternative had to achieve the FRG of 23.3 pCi/g for Cs-137. The Cs-137 FRG of 23.3 pCi/g is a risk-based remediation goal that ensures protectiveness of human health and the environment. This FRG will provide unrestricted land use in 100 years. The principal ARAR evaluated for the Disposal Pond was the Idaho Fugitive Dust Emissions requirements. In addition to the "No Action" alternative, three alternatives were evaluated to remediate the Disposal Pond site:

- Alternative 1: Limited Action
- Alternative 2: Containment
- Alternative 3: Excavation and Disposal.

Details of the alternatives considered and the evaluation process are included in Sections 10 and 11 of the OU 1-10 RI/FS Report.

8.2.2.1 Alternative 1: Limited Action. Under Alternative 1, existing management practices, including institutional controls and environmental monitoring, would continue for the period of institutional control. The cost for this alternative is $1.2 million.

Alternative 1 would accomplish the site RAOs in a long timeframe because contamination would be left in place. To accomplish the RAOs, long-term institutional controls must be implemented to protect future occupational and residential land use. Institutional controls are a primary component of this alternative.

Alternative 1 would protect human health and the environment and would comply with the regulations. Although contamination would be left in place, the radioactivity would decay to within acceptable levels during the 100-year period of institutional control. Ecological exposure would be minimized when pond operations cease and water is eliminated from the pond. Long-term effectiveness would be high. Short-term effectiveness would be high, because workers would not be exposed to contaminants. This alternative would not reduce toxicity, mobility, or volume through treatment; however, it would prevent the spread of contamination from the site. Because the management practices are already in place, implementability would be high.

8.2.2.2 Alternative 2: Containment. Alternative 2 would consist of covering the contaminated site with either a native soil cover (Alternative 2a) or an engineered barrier (Alternative 2b). The native soil cover would consist of a layer of INEEL soil and surface vegetation or a layer of rock to control surface exposures to subsurface radionuclides. The engineered barrier would consist of a cap of multiple layers of native geologic materials to control surface exposures to subsurface radionuclides and inhibit plants from growing and animals from burrowing. In addition, institutional controls would be required until the cesium decayed to acceptable levels. The cost for these alternatives are $5.6 and $4.5 million, respectively.

Both variations of Alternative 2 would accomplish the site RAOs in a short timeframe because the cover can be completed within a short time period. To maintain the RAOs, long-term institutional controls must be implemented to protect future occupational and residential land use.

Alternative 2 would protect human health and the environment and would comply with the regulations. Contamination would be left in place; however, it would be contained and will decay to

within acceptable levels within 100 years, resulting in high long-term effectiveness. This alternative would not reduce toxicity, mobility, or volume through treatment; however, it would prevent the spread of contamination from the site. There would be a possibility for worker exposure during construction of the cover, reducing the short-term effectiveness. Implementability of this alternative would be moderate.

8.2.2.3 Alternative 3: Excavation and Disposal. Under Alternative 3, the contaminated soil would be excavated and disposed at an approved repository either on the INEEL (Alternative 3a) or off-Site (Alternative 3b). The cost for these alternatives are $20.9 and $54.0 million, respectively.

Both variations of Alternative 3 would accomplish the site RAOs in a short timeframe because contamination would be permanently removed. It is expected that no institutional controls would be required after the remedial action, and this will be verified by confirmational sampling.

Alternative 3 would protect human health and the environment and would comply with the regulations. Long-term effectiveness would be high because contaminants would be removed. This alternative would not reduce the toxicity, mobility, or volume of the contaminants through treatment; however, it would prevent the spread of contamination from the site. There would be a possibility for worker exposure during excavation, reducing the short-term effectiveness. The implementability would be moderate.

8.2.3 Summary of Comparative Analysis of Alternatives

The following sections summarize the evaluation of the candidate remedial alternatives according to the criteria identified in Section 7.1.3 of this ROD. Detailed comparative analyses can be found in Section 12 of the RI/FS Report.

8.2.3.1 Threshold Criteria. The two threshold criteria, which must be satisfied by the selected remedy, are overall protection of human health and the environment, and compliance with ARARs. All of the alternatives for the Disposal Pond (Alternatives 1, 2a, 2b, 3a, and 3b) meet the threshold criteria.

8.2.3.2 Balancing Criteria. The five balancing criteria are: (1) long-term effectiveness and permanence, (2) reduction of toxicity, mobility, or volume through treatment, (3) short-term effectiveness, (4) implementability, and (5) cost.

All of the alternatives best satisfy the criterion of long-term effectiveness because all remaining contamination would be below risk-based concentrations and allow unrestricted land use in 100 years, either by removal of contamination or by radioactive decay and use of institutional controls. Reduction of toxicity, mobility, or volume through treatment is least satisfied by all of the alternatives, however, each of the alternatives prevents the spread of contamination from the site. Alternative 1 best satisfies short-term effectiveness because workers will not be exposed to contamination. Alternatives 2a and 2b only partially satisfy short-term effectiveness because of the possibility of worker exposure during construction of the cover. Alternatives 3a and 3b least satisfy short-term effectiveness because of the potential for worker exposure during excavation. Alternative 1 best satisfies the implementability criteria because the management practices are already in place. Implementability is only partially satisfied by Alternatives 2a, 2b, 3a, and 3b because implementability would be moderate. Alternative 1 has the lowest estimated cost and Alternative 3b has the highest estimated cost.

8.2.3.3 Modifying Criteria. The modifying criteria, used in the final evaluation of remedial alternatives, are state and community acceptance. State acceptance is demonstrated by IDHW concurrence with the selected remedial alternative and signature of this ROD. The IDHW was involved

in the development and review of the RI/FS Report (DOE-ID 1997b), the Proposed Plans (DOE-ID 1998a and DOE-ID 1998b), the FS Supplement (DOE-ID 1998c), this ROD, and other project activities such as public meetings.

For community acceptance, the factors that are considered include which elements of the alternatives interested persons in the community support, have reservations about, or oppose. The comments received on the Proposed Plan form the record of these opinions and concerns.

Generally, the selected remedy is supported, although comments showed some preference for alternatives that remove or treat contaminated soil. The Responsiveness Summary (Part III) portion of this ROD documents the full range and content of the public comments received regarding the recommended action at this site.

8.2.4 Selected Remedy: Alternative 1, Limited Action

Based on consideration of the requirements of CERCLA, detailed analysis of alternatives, and public comments, the Agencies selected Alternative 1, Limited Action. The major components of the selected remedy include:

- Soil sampling will be performed for contaminants identified in the TSF-05 injection well to support a no-longer-contained-in determination for the surface soils at TSF-07
- Inspecting existing operational controls to assess the adequacy and need for additional institutional controls
- Implementing additional institutional controls as needed, including access restrictions (e.g., fences, posted signs, and permanent markers) limiting land use for at least 100 years
- Environmental monitoring for at least 100 years to protect current and future occupational receptors.

The alternative was selected because it will meet the site RAOs by allowing Cs-137 to decay to less than unrestricted land use concentrations within the period of institutional controls. The Limited Action alternative complies with requirements of the NCP by using controls to address the low-level threat posed by the Disposal Pond, and satisfies guidance for conducting an FS under CERCLA. Limited action consists of existing management practices, including institutional controls and environmental monitoring. Under this alternative, the implementation of institutional controls and environmental monitoring would be expanded to accommodate site-specific concerns. In addition, 5-year site reviews would be conducted to evaluate the effectiveness of the institutional controls and the need for further environmental monitoring, or additional control measures, as applicable. Additional information about the 5-year site reviews is given in Section 10. Section 12 details institutional controls to be implemented at this site. Some changes may be made to the remedy as a result of the remedial design and construction process that result from the engineering design process.

8.2.4.1 Estimated Costs for the Selected Remedy. The estimated capital and maintenance costs for implementing the selected remedy at the Disposal Pond is $1,184,508. The costs are presented in net present value, which allows for equal comparison of long-term and short-term alternatives while factoring in inflation. Details of the cost estimates are summarized in Table 8-5 and presented in full in Appendix J of the RI/FS Report.

Table 8-5. Cost estimate summary for the Disposal Pond (TSF-07) selected remedy.

		$ Fiscal Year (FY)-97
FFA/CO Management and Oversight		
	WAG 1 – Management	141,852
Remediation Oversight		
	Construction Oversight	17,550
	Construction Project Management	29,250
	Remedial Action Document Preparation	24,233
	Remedial Action Report	10,880
	Packaging, Shipping, Transportation Documentation	N/A
	WAG-Wide Remedial Action 5-Year Review	39,474
Remedial Design		
	Title Design Construction Document Package	11,880
	Remedial Design Documentation per WAG 1 Baseline	31,928
	Prefinal Inspection Report	8,000
Remedial Action		
	Capital Costs	75,000
	Subcontractor Indirect Costs	57,600
CAPITAL COST SUBTOTAL		447,647
	Contingency @ 30%	134,294
TOTAL CAPITAL COST IN FY-97 DOLLARS		581,941
TOTAL CAPITAL COST IN NET PRESENT VALUE		524,686
Operations		
	WAG 1 – Management	625,526
	Annual Operations and Maintenance Reports	75,000
Surveillance and Monitoring		605,000
OPERATION & MAINTENANCE (O&M) COST SUBTOTAL		1,305,526[a]
	Contingency @ 30%	391,658

Table 8-5. (continued).

	$ Fiscal Year (FY)-97
TOTAL O&M COST IN FY-97 DOLLARS	1,697,183
TOTAL O&M COST IN NET PRESENT VALUE	659,822
TOTAL PROJECT COST IN NET PRESENT VALUE	1,184,508

a. O&M was calculated using 100 years of maintenance and a discount rate of 5%.

8.2.4.2 Protection of Human Health and the Environment. Alternative 1, Limited Action, will meet the RAOs since Cs-137 will decay to less than unrestricted land use concentrations within the 100-year institutional control period and, therefore, be effective in protecting human health and the environment. However, in order, to reduce the potential for unacceptable exposures to future workers or residents, the existing institutional controls will be maintained until such time there is acceptable risk from the site due to decay of Cs-137.

8.2.4.3 Compliance with ARARs. The selected remedy meets the identified ARARs as shown in Table 8-6.

8.2.4.4 Cost Effectiveness. The remedial action selected is cost-effective because it provides overall effectiveness in meeting the RAOs proportionate to its costs. When compared to other potential remedial actions, the selected remedy provides the best balance between cost and effectiveness in protecting human health and the environment.

Table 8-6. ARARs for the Disposal Pond (TSF-07) selected remedy.

Citation		Reason	Relevancy[a]
Chemical-Specific ARARs			
NESHAPs	"Radionuclide Emissions from DOE Facilities" 40 CFR 61.92	Limits exposure of radioactive contamination release to 10 mrem/yr for the off-Site receptor, and establishes monitoring and compliance requirements.	A
	"Emission Monitoring" 40 CFR 61.93		A
	"Emission Compliance" 40 CFR 61.94(a)		A
Resource Conservation and Recovery Act (RCRA) – Standards Applicable to Generators of Hazardous Waste	"Hazardous Waste Determination" IDAPA 16.01.05.006 (40 CFR 262.11)	A HWD will be required for samples taken to obtain a no-longer-contained-in determination.	A
RCRA – Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Units	"Security of Site" IDAPA 16.01.05.008 (40 CFR 264.14)	Measures must be taken to restrict access to the site for as long as direct exposure to hazardous contaminants is possible.	RA
	"General Inspections" IDAPA 16.01.05.008 (40 CFR 264.15)	Regular inspections of the site are required for as long as direct exposure to hazardous contaminants is possible.	RA
To-Be-Considered			
Radioactive Waste Management	DOE Order 435.1	Order that provides guidance on disposal of low-level radioactive waste at DOE facilities.	
Radiation Protection of the Public and the Environment	DOE Order 5400.5, Chapter II (1)(a,b)	Order that limits the effective dose to the public from exposure to radiation sources and airborne releases.	
Institutional Controls	Region 10 Final Policy on the Use of Institutional Controls at Federal Facilities	Applies to contamination left in place or remaining above 1E-04 risk.	

a. A = applicable; RA = relevant and appropriate

NESHAPs = National Emission Standards for Hazardous Air Pollutants

IDAPA = Idaho Administrative Procedures Act